

**CONCERNING THE SUBSPECIES OF *SARCOPHAGA DUX*
THOMSON.***

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The flies of the genus *Sarcophaga* previously considered to be subspecies of *S. tuberosa* Pandellé must hereafter be known as subspecies of *S. dux* Thomson. The latter was described from Hawaii by Thomson in *Eugenies Resa* (pp. 533-540) in 1870 but the relationship of the species was only recently discovered by Dr. Aldrich while examining Hawaiian material. *S. tuberosa*, on the other hand, was described by Pandellé in 1896 (*Rev. Ent. Franc.*, Vol. 15, p. 192). The subspecies affected by this change are *dux*, *tuberosa*, *exuberans* Pandellé, *sarracenooides* Aldrich, *luzonensis* (herein described as new), a new species not named for reasons stated below, and possibly *pedestris* Villeneuve (from Arabia) and *maderensis* Schiner (from Madeira). The last two species I have not seen and though Dr. Böttcher (*Deutsch. Ent. Zeitschr.*, 1912, p. 736 and 1913, pp. 368-369) indicates their relationship to "*tuberosa*," yet he gives no positive data that would justify their inclusion in the group of subspecies. One subspecies is mentioned above as unnamed because of two specimens, determined by Dr. Böttcher as "*Sarcophaga tuberosa exuberans* Pandellé," and sent to the writer at different times by Dr. Bezzi. The first (from Italy) proved to be distinct from what has been called *exuberans* in this country and the writer thereupon prepared a manuscript describing our form as *shermani*. Before this was published the first specimen received was lost in the mail and the second on arriving shortly afterwards proved to be the same as our form which the writer was describing as *shermani*. Hence it is impossible to know positively which of the two forms was *exuberans* without reference to the type. Whichever is not, is new. The chief distinguishing characters of these two forms are given in the next paragraphs and for convenience they may be designated as subspecies *a* and *b*.

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Subspecies a.—The form present in the United States and always considered to be *S. exuberans*. Distinguishing characters of male: three rows of black cilia behind eyes; cheek vestiture black; anterior profile outline of forceps prong gently sinuate near tip; the two pairs of distal processes of penis very slender, that pair arising centrally quite long (longer and more slender than in any other known subspecies); posterior spur-like protuberance of distal sclerite of penis very prominent (largest and longest of any subspecies); first genital segment usually brownish, sometimes brownish posteriorly shading into dull orange anteriorly, less commonly dull orange throughout; second genital segment dull orange. It is considered best to consider this form as *exuberans* for the present and it is so discussed in this paper.

Subspecies b.—This form has for the distinguishing male characters the following: Two rows of black cilia behind eyes; vestiture of posterior portion of cheek white, that of anterior portion black; see also figure 13 for characters of penis. The two forceps are essentially the same as in subspecies *a* (considered to be *exuberans*), but the characters of the distal processes and distal sclerite are distinctive.

Examination of specimens of *S. dux* loaned by Dr. Aldrich and of further material subsequently received from Hawaii has convinced me that the subspecies described by me as *S. subtuberosa* (Proc. U. S. Nat. Mus., vol. 54, pp. 89-92) is identical with it. *Subtuberosa*, therefore, becomes a synonym of *dux*.

Ordinarily the brownish color of the first genital segment of *exuberans* (subspecies *a*) would be sufficient to separate it from *sarracenoïdes* but when this segment is dull orange in color, the only reliable character are those of the forceps and penes. It is probably only rarely that the first genital segment of *exuberans* would not show some brownish coloration, at least posteriorly. In the figures note that the posterior spur-like protuberance of the penis is smaller and more slender and the distal processes shorter and thicker in *sarracenoïdes*.

S. luzonensis, herein described, is likely to be confused with *tuberosa*, *harpax* and *dux*, all of which have both genital segments black. It is at once distinguished, however, by the presence of two rows of black cilia behind the eyes, while the first two

species named both have three rows and the last but one. Furthermore, *tuberosa* and *harpax* both have the cheek vestiture black, but in *dux* it is similar to that of *luzonensis*.

***Sarcophaga dux luzonensis* n. subsp.**

Male. The characters which distinguish this subspecies from others of the group are as follows: two rows of black cilia behind the eyes; vestiture of posterior portion of cheeks white, that of anterior portion black; first and second genital segment black; tip of forceps prong in profile quite blunt, posteriorly with a distinct tooth; posterior spur-like protuberance of distal, posterior sclerite of penis small and scarcely differentiated (smallest of any of the subspecies).

Described from three male specimens. Holotype (male): author's collection. Length: 8-12 mm.

PHILIPPINE ISLANDS: Mt. Makeling (holotype); Malinoa, Tayabas; Los Baños (C. F. Baker); AUSTRALIA: Queensland, Townsville (F. H. Taylor).

The specimen from Australia is small and not quite typical. There is a partial third row of black cilia behind the eyes, and the forceps do not exactly correspond, but there is no reason to regard it as anything other than an atypical specimen without a considerable series of specimens to compare.

These subspecies are also interesting because of their distribution; one or more of them are known from each continent except South America. A brief summary of distribution is here given. The information is based on occurrence as given by Böttcher (*Deutsche Entomologische Zeitschrift*, 1912 and 1913), Aldrich ("Sarcophaga and Allies," 1916) and determinations made by author.

S. dux tuberosa Pandellé: EUROPE, Germany, Switzerland, Roumania, Dalmatia, Hungary, Italy, Spain; ASIA, India, Japan; NORTH AMERICA, Canada (Awena, Manitoba, N. Criddle), United States.

S. dux dux: ASIA, Philippine Islands; PACIFIC ISLANDS, Guam, Hawaii.

S. dux harpax Pandellé: EUROPE, Germany, Austria, Hungary, Italy; ASIA, Japan Formosa, Philippine Islands; NORTH AMERICA, United States; PACIFIC ISLANDS, Hawaii.

S. dux luzonensis n. subsp.: ASIA, Philippine Islands; AUSTRALIA, Queensland.

Subspecies a (*exuberans* Pandellé).—Occurs in certain countries of Europe, and probably in Africa and in the United States and Canada.

S. dux sarracenoïdes Aldrich: NORTH AMERICA, United States, Canada.

Subspecies b. EUROPE, Italy.

TABLE FOR THE SUBSPECIES OF *SARCOPHAGA DUX* Thomson.

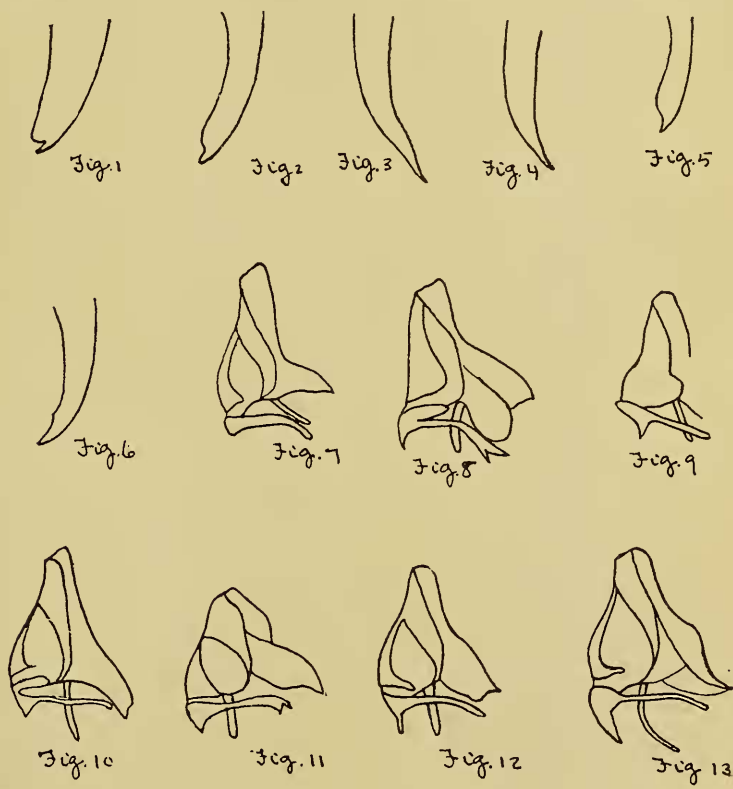
1. Both genital segments black.....	2
At least second genital segment dull orange.....	5
2. Cheek vestiture black	3
Vestiture of posterior portion of cheek white.....	4
3. In profile anterior and posterior edges of tips of forceps prong parallel and prong with an apical tooth (Fig. 2, 8).....	<i>harpa</i> Pandellé.
Forceps more slender in profile, anterior edge near tip gently sinuate (Fig. 3, 10)	<i>tuberosa</i> Pandellé.
4. One row of black cilia behind eyes, forceps prong as in <i>tuberosa</i> (Fig. 4, 11)	<i>dux</i> Thomson.
Two rows of black cilia behind eyes, in profile forceps prong blunt, stout and with apical, posterior tooth (Fig. 1, 7).....	<i>luzonensis</i> n. subsp.
5. Vestiture of posterior portion of cheek white, two rows of black cilia behind eyes (Fig. 9).....	subspecies <i>b.</i>
Cheek vestiture black, three rows of black cilia behind eyes.....	6
6. Both genital segments dull orange, forceps approximately as in <i>harpa</i> (Fig. 5, 12).....	<i>sarracenoïdes</i> Aldrich.
First genital segment usually wholly brown, sometimes partly brownish, rarely without some brown coloration; forceps edges not parallel, in profile anterior edge sinuate near tip (Fig. 6, 13).....	subspecies <i>a.</i>

The figures of the forceps and genitalia should be used in conjunction with the above table. There is considerable difference in the form of the anterior portion of the penis, though the differences are due to variations in a fundamentally similar structure in each case. It is not wise to place reliance in apparent differences, however, because bending and folding of the delicate edges frequently results in anything but the normal appearance.

The writer has in his records several unpublished notes concerning the habits of three of these flies which are included.

S. dux harpax Pandellé. Material determined for Mr. A. F. Burgess of the Bureau of Entomology was reared from the pupæ of gypsy moth imported from Japan (record numbers 3317 S, 3353, 1638 A, 3314 S), and Austria (853 A). Aldrich has referred to records from German material.

S. dux sarracenoides Aldrich. A male and a female received from Dr. O. C. Bartlett, Phœnix, Arizona, were labelled "Bred from dead larvæ of *Lonicera nitida*, the green June-bug or fig-eater." Two males and two females received from G. H. Vansell, of Lawrence, Kansas, were labelled as reared from *Melanoplus differentialis* and *M. bivittatus*, Ford Co., Kansas. Specimens from W. P. Hayes, of Manhattan, Kansas, were reared by him from dead specimens of *Lachnosterna gibbosa*, *lanceolata*, *rubiginosa*, *crassissima*, *implicata* and *rugosa*. In the collection



of the Massachusetts Agricultural College is one specimen bearing the following label: "From maggots in a crab (sea spider), Harpswell, Maine." At Laurel, Montana, in 1914, the author reared this fly from decaying fish. A few specimens were reared by J. R. Parker of the Montana Experiment Station, from dead grasshoppers collected in the Flathead Reservation in the summer of 1917. Others were reared from similar material collected in early September by J. R. Parker and the author.

S. dux subspecies *a* (*exuberans* ?).—A single specimen of this subspecies emerged early in February of 1918 from a dead grasshopper collected by the persons above-mentioned near Ronan, Montana, on September 5, 1917.

EXPLANATION OF FIGURES.

- FIG. 1. Profile view of tip of forceps prong of *S. dux luzonensis*.
 FIG. 2. Profile view of tip of forceps prong of *S. dux harpax*.
 FIG. 3. Profile view of tip of forceps prong of *S. dux tuberosa*.
 FIG. 4. Profile view of tip of forceps prong of *S. dux dux*.
 FIG. 5. Profile view of tip of forceps prong of *S. dux sarracenooides*.
 FIG. 6. Profile view of tip of forceps prong of *S. dux* subspecies *b*.
 FIG. 7. Distal portion of penis of *S. dux luzonensis*.
 FIG. 8. Distal portion of penis of *S. dux harpax*.
 FIG. 9. Distal portion of penis of *S. dux* subspecies *a* (*exuberans* ?).*
 FIG. 10. Distal portion of penis of *S. dux tuberosa*.
 FIG. 11. Distal portion of penis of *S. dux dux*.
 FIG. 12. Distal portion of penis of *S. dux sarracenooides*.
 FIG. 13. Distal portion of penis of *S. dux* subspecies *b*.

* The genital segments of the single specimen of this species examined were in such condition that it was impossible to figure the forceps prong or to complete the figure of the penis.